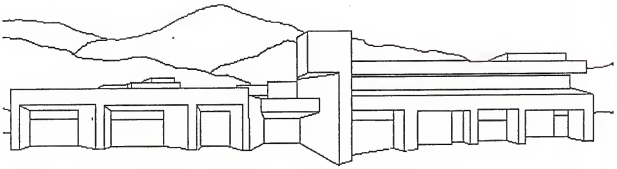
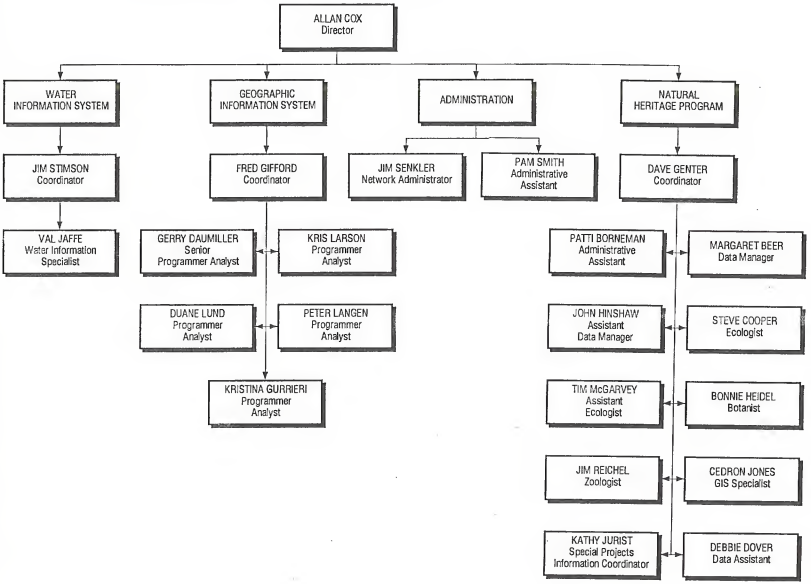


Montana Natural Resource Information System

Fiscal Year 1994 Annual Report

NRIS

Montana Natural Resource Information System



INTRODUCTION

The Montana Natural Resource Information System (NRIS) was formed in response to the growing need for quick access to the increasing amounts of natural resource information. NRIS was designed **to be a comprehensive program for the acquisition, storage, and retrieval of existing data relating to the natural resources of Montana.** In 1985, NRIS began by providing services through its Montana Natural Resource Index and the Montana Natural Heritage Program. In response to growing user needs, the program has expanded to include the Montana Water Information System and the NRIS Geographic Information System.

Over the years, NRIS has strived to meet the growing information needs and challenges of Montana's governmental agencies, private business, and general public by developing new services. NRIS now offers a wide variety of data management, information indexing, and data retrieval services.

NRIS Mission Statement

The Montana Natural Resource Information System provides comprehensive access to information about Montana's natural resources to all Montanans through the acquisition, storage, retrieval, and dissemination of that information in meaningful form.

Fiscal year 1994 was a busy time for NRIS. We filled over 1850 requests for natural resource information and services. The **Natural Heritage Program** responded to over 740 requests; the **Water Information System** responded to over 500 information requests; and the **Geographic Information System** responded to nearly 600 service and information requests.

Specific program accomplishments are described in each of the program reports on the following pages. Also included are request statistics for the year and an organizational staff chart.

Water Information System Report

OVERVIEW

1994 was one of the busiest and most productive years for Water Information System staff since the program was established in 1987. Substantial progress was achieved in providing water information clearinghouse services, upgrading computer software and hardware, providing public access to data, continuing training of staff on the use of GIS, expanding the number of data sources, securing stable and high speed access to sources and users, and in outreach and promotion of the Water programs. Water Information and GIS made real head way during 1994 in working together to serve users requesting water and other types of information.

INFORMATION REQUESTS

About 520 individual requests for water information were received during 1994. This represent an increase of about 75% over the number received in the previous year. Of the 520 requests, approximately 48 percent came from state agencies, 20 percent were from federal agencies followed by private-for-profit users at 14 percent. Private non-profit user requests represented 11 percent of the total requests. Among state agencies, DNRC continues to use the System the most at 37 percent, followed by DHES, DSL, FWP, and DOT. The patterns of sector and agency remain consistent with historical usage. The pattern indicates the Water System is fulfilling its original mandate to improve the management and accessibility of water information, especially for state data resources and users. It is significant to note the Water System experienced a sizable increase in use every year it has been in operation. It is also significant to note that staffing for the Water System is at the same as in 1987. Efficient use of skilled staff and computer resources accounts for the programs ability to handle significantly increased request load. However, if the request load continues to increase, and a priority is placed on increasing use of the GIS as a tool for clearinghouse activities, staffing for the Water Information System will need to be increased.

Computer resources for the System were upgraded during the period. The upgrade resulted from successful negotiations to replace a computer that had not performed to Water Information staff standards. The new computer is a high performance 486 capable of interfacing with the NRIS GIS workstations. In addition, two high speed modems were acquired for the program that greatly improve the rate of data transfer. These improvements help the Water Information staff to work more efficiently and handle the increase request load.

PROGRAM OUTREACH

Outreach to potential System users continued to be a high priority. Efforts focused on providing presentations and poster presentations at meetings and conferences, providing tours of the Water Information System and NRIS, placing factsheets and information sheets in public libraries around the state, and by placing electronic versions of the factsheets on electronic bulletin board systems (bbs) and on Internet. Increased use of the State bbs and Internet was achieved

during 1994. Judging by the increased use of the Water System, and NRIS data services as a whole, the outreach efforts have been successful.

WATER RELATED COORDINATION COMMITTEES

Advising committees on water information policy continued to be an important and valuable activity. The committees are an effective forum for tracking statewide activities of other state and federal agencies and for keeping appraised of laws and policies effecting water resources. The committees also provide solid opportunities to inform staff from the Governor's Office, legislators, and state and federal agency personnel about the Water Information System status and services. The Water Information Coordinator is the lead NRIS staff for these activities.

Legislative Water Policy Committee: This Committee met nine times during 1994 and the Water Information Coordinator attended the majority of the meetings. The Coordinator also attended one of the field trips and public meetings sponsored by the Committee. The Coordinator provided updates on the Water Information activities, services, and refinements. Updates were also provided by the Coordinator on Drought Monitoring and its GIS map products, and on Ground Water Assessment Programs. The Water Coordinator is the Chairman of the Committee that oversees Montana Ground Water Assessment Program. GIS and Water Information staff provided maps of the Big Hole Basin showing general hydrologic features, and points of diversion and place of use from the DNRC Water Rights data base. These maps were used to help the Committee examine water use, instream flow, and other water availability issues in the basin. Maps were presented in a public meeting and field trip of the basin in June 1994. Their use represents an important initial step by the Water Policy Committee to employ GIS technology to address timely and difficult water policy issues.

Environmental Quality Council (EQC): The EQC met eight times during 1994 to review and study a variety of issues related to natural resources. The Water Information Coordinator attended most of the meetings to provide updates on the Water System, Drought Monitoring, Ground Water Assessment, and other water information issues. Water Information and GIS components of NRIS assisted the EQC with a comprehensive study on hazardous waste generation and disposal in Montana. Maps were provided showing where hazardous waste is generated within the State. A second set of maps showing where Montana's wastes are shipped for disposal in other states were also developed to support the Committees study. The NRIS maps will be included in a formal report to the Montana State Legislature during its 1995 session. It should be noted that use of the GIS maps represents the first time GIS technology was used to support a EQC special study. Feedback from the EQC director and staff indicate that the maps were well received by the Committee and were quite useful in helping the Subcommittee and staff achieve their goals.

Ground Water Assessment Steering Committee: NRIS's Water Information Coordinator chairs this Committee. Ground Water Assessment Act programs

experienced a serious funding short-fall in 1994 due to lower than expected revenues to the Resource Indemnity Ground Water Assessment Trust (RIGWAT), formerly the RIT, and due to an error in the Metalliferous Mining Tax law. In short the programs received $262,000 less than was expected for the year. This resulted in personnel layoffs and a total stoppage of field work. To help end the funding crisis, the Committee Chairman assisted the Montana Bureau of Mines and Geology (MBMG) staff in making a series of detailed presentations to the Legislative Water Policy Committee, Environmental Quality Council, Revenue Oversight Committee, and Legislative Finance Committee. These efforts were time consuming and prolonged but resulted in the Governor's office signing a grant agreement to insure the Assessment Act programs would receive full funding for FY 95, and to eliminate $130,000 deficit. There will also be legislation submitted to correct the error in the Metalliferous Mine Tax law and address funding for the ground water programs in the long-term. It is anticipated that the Water Information Coordinator will be requested to provide testimony on behalf of Ground Water Assessment Programs during the 1995 Legislative session. For the coming year, the Ground Water Assessment Steering Committee will meet three times, NRIS will host two of the meetings and the MBMG hosting one.

Ground Water Policy Committee - Education Subcommittee: EPA required the DHES to establish this committee to develop a comprehensive strategy to guide the state agencies as they create policies for ground water use and protection. The NRIS Water Information Coordinator participated in 4 of the 5 meetings held during 1994 to monitor and advise the committee on information related issues and to worked with a subcommittee on education. In addition, a grant proposal for developing ground water education software was written by the Coordinator, in part due to a request from the DHES WQD, which is compatible with the goals set out by the Committee. The grant proposal would use ground water atlas data and map compositions in conjunction with a curriculum workbook to help educate the public on the availability of ground water, its importance in the State, and the need for protection. While the proposal was not selected for funding by EPA, the States Ground Water Committee made a preliminary suggestion to resubmit the proposal to other funding organizations.

Water Resources Coordination Committee: Five meetings were convened during 1994 and the Water Coordinator attended all but one of them. The Committee's aim is to help to coordinate information sharing and to guide DHES personnel in designing non-point source programs. The Water Information Coordinator made several presentations to the Committee emphasizing the needed for improved communication and use of information shared at the meetings to increase coordination and cooperations. A presentation on NRIS activities and the connection to Internet was provided by the NRIS Director. DHES and DNRC have requested increased involvement of the Water Coordinator in helping shape and guide the activities of this committee.

Governor's Office - Sustainable Communities Pilot Project: WIS and GIS staff worked with personnel from the Governor's Office to create maps of state and federal agencies administrative boundaries. The maps were used in a series of

meetings exploring how administrative activities and programs could be simplified and streamlined. These map products represent an important step to use GIS for this purpose by the Governor's Office.

INTERNET ACCESS

Access to Internet is scheduled for completion late in the year (FY94). Water Information staff have been in contact with data sources to secure access via Internet. Sources capable of supporting Internet access include: the U. S. Geological Survey (USGS), U. S. Environmental Protection Agency (USEPA), National Ocean and Atmosphere Administration (NOAA), U. S. Weather Service (USWS), and the Montana Bureau of Mines and Geology (MBMG). These sources supply the majority of data the Water System provides to users. Access through the Internet promises to greatly improve data transfer performance and to minimize errors. It also makes it possible to access a substantially greater number of sources than is now available over phone lines. Another service that will become available to the Water Information Component is the ability to place data and map products on the Internet where users can examine and obtain them. Examples of products that will be made available include; weekly streamflow data, Palmer Drought Severity Indices, Surface Water Supply Indices, drought maps and charts, and ground water atlas data and maps.

PROJECTS OVERVIEW

Montana Rivers Information System (MRIS): An update of fisheries and recreation data was completed and refinements on the user interface software were finished. Users of the MRIS were notified of the availability of the updated MRIS. Programming efforts are now focusing on a Lakes data base and preliminary layout and structure are being designed. MRIS data continues to be requested frequently and the data base continues to be one of the primary sources of river related information. The next years budget has been finalized and includes funding for examination of off-the-shelf data base software that could replace the Clipper software currently used to develop MRIS programs. While the Clipper version of MRIS will be supported in the future, efforts will be made to utilize other software for new data base products.

Montana Drought Monitoring: Drought Monitoring proved very useful in 1994 due to wide spread and prolonged drought conditions in the State. The Monitoring program produced about 240 copies of each map for the period February to August, 1994. Maps were distributed in the DNRC monthly surface water supply report and by placing graphic images of the maps on the State's Bulletin Board System (BBS). On administrative issues, NRIS contracts with the DNRC and the Montana Climate Center (MCC) to extent the term, and to modify the date for final payment to the MCC. Both contracts will terminate in March 31, 1995.

The Water Information Coordinator was requested to provided facts concerning the Monitoring System, status of the Climate Center at MSU, and the need to modify the Palmer Drought Severity Index to the Montana Water Research Center

and the Office of Senator Conrad Burns. Efforts were being made to find additional funding for the Climate Center and Drought Mitigation support. At this time no word has been received from either office.

Montana Ground Water Atlas: Several meetings were held with EPA Region XIII and DHES WQD personnel on the layout and design of Atlas maps. Conference calls have also been placed to coordinate with EPA. Ten maps were selected for inclusion in the Atlas with several other maps being considered for inclusion if funding allows. Current efforts focus on writing the Atlas text by drawing from existing sources but making a considerable effort to simplify the discussion to make it understandable to a larger audience. Analysis of well distributions will also be undertaken to determine if wells drilled into the Quaternary Alluvium can be distinguished, as a group, from wells drilled into Late Tertiary to Early Quaternary sediments based on drilling depth and water yield. The contract term was extended to December 31, 1994.

Water Reference Guide: A contract with the Montana WaterCourse Program at MSU was drawn up to provide GIS map products for a short reference guide for water resources. The effort is part of WaterCources program to help the public become more knowledgeable with the water resources, especially within their own watershed or basin. The Water Information Specialist will take the lead on the project with assistance from GIS programmers.

Volunteer Water Monitoring: At the request of DHES WQD, the Water Information Coordinator wrote a grant proposal to the EPA to support statewide volunteer water monitoring. The Coordinator was assisted by personnel from the DHES WQD and WaterCoarse. Under the proposal, water information system staff will provided software, training, and technical support for management of volunteer monitoring data. If successful, the project will be funded about January, 1995.

The Water Information Coordinator was also requested to speak at the National Volunteer Water Monitoring Conference in Portland, Oregon. The presentation was entitled "Using GIS to support Volunteer Water Monitoring." Shortly after the conference, the Coordinator was invited to submit a written version of the presentation for inclusion in the conference proceeding which will be distributed nationally. The proceedings will be available sometime after January, 1995.

1994 Geographic Information System Report

OVERVIEW

As the use of GIS technology for managing and analyzing natural resource data continues to grow, NRIS GIS finds demands for its services from all sectors increasing -- not only are the number of individual requests increasing, but the number of products per request is increasing. During FY94 we filled 598 total requests and developed 6,953 products. This represents a 14% increase in

number of requests and a 43% increase in the total number of products produced. The tables below summarize GIS products and services provided during the last two fiscal years.

FY 1994 GIS Services Summary

Total Requests	Maps	Reports	Programs	Data	Other	Total Products
598	5695	111	37	1053	57	6953

FY 1993 GIS Services Summary

Total Requests	Maps	Reports	Programs	Data	Other	Total Products
522	3325	73	28	1310	96	4832

INTERNET ACCESS

As new technologies emerge, NRIS GIS strives to evaluate their impact on our patrons. We evaluate how these technologies affect our current oporations and how we might take advantage of these technologies to fulfill their needs. The Internet was identified during FY93 as one area we needed to be aggressively pursuing. We determined that we needed to be able to efficiently search Internet resources for our patrons and we needed to be able to be an information provider on the Internet as well.

In order to be an information provider we identified the need for a high speed connection to the Internet as a top priority. Working with ISD and other Montana libraries we acquired a relatively high speed connection and started implementing data services on the Internet. Currently patrons who are on the Internet can access the GIS program to find general information or to access selected map graphics, documentation, and databases. We also allow patrons to access our computers directly to retrieve data files that we have developed for their specific needs. These services have been implemented by installing a World Wide Web (WWW) server and "Home Page" as well as an "Anonymous FTP" site on the GIS computer network. We are finding the Internet to be a valuable tool and expect to continue to expand our capabilities in the future.

MONTANA GIS USERS GROUP

The NRIS GIS plays an active role in the Montana GIS Users Group. The user group is a non-profit consortium of government agencies and business involved with GIS technology. The main activities of the users group are the annual users

conference and publication of the *Montana GIS News*. The *Montana GIS News* is designed to facilitate the transfer of information about GIS data, activities, and projects in Montana. The newsletter is published by NRIS for the Montana GIS User Group.

The annual Montana GIS User Conference provides an opportunity for individuals interested in GIS to share ideas and experiences. The 1994 Conference in Kalispell attracted over 300 people. NRIS helped with the conference by providing administrative support, active participation on the planning committees, hosting workshops, and making presentations. NRIS also hosted a Public Night where members of the local community had the oportunity to learn about GIS.

Fred Gifford, NRIS GIS Coordinator, served as president of the Users Group board of directors during 1994 and Kris Larson from NRIS was elected to the board at the conference in Kalispell.

MONTANA INTERAGENCY GIS TECHNICAL WORKING GROUP

The Montana Interagency GIS Technical Working Group (TWG) is a forum for the exchange of information regarding the acquisition of new GIS data, the existence of current GIS data, and information relating to GIS projects. NRIS supports the TWG by providing administrative support and actively participating in meetings and sub-committees. Major accomplishments for the TWG during FY 1994 were acquiring a grant from the Federal Geographic Data Committee to fund the development of tools, databases, and procedures to facilitate data sharing and cooperation among GIS users in Montana. The funding under this grant will be made available during FY95.

GIS SEMINARS

For the past four years, the NRIS Program has offered a series of GIS Seminars. The seminars are held once a month throughout the fall, winter, and spring. A GIS expert typically gives an hour long presentation to a wide variety of GIS users from governmental agencies and the private sector. The topics of the seminars range from software specific technical tips and tricks, to general information about topics such as cartography or new GIS projects in the state.

GIS IN LIBRARIES

Several new libraries joined the "GIS in Libraries" program in 1994. We are sponsoring new schools in the "K-12 GIS Program" as well. The libraries and schools participating in the projects now include: Dennis Richards at the Mansfield Library in Missoula; Cynthia Rooley at the Liberty County Library; Tim Urbanic at the Billings Vo-Tech Library; Bill McGregor at the Citizens Technical Environmental Committee in Butte; Alice Hallstrom, Hot Springs Library; Nancy Brennan, Bicentennial Public Library, Colstrip; Michael Ober at the Flathead Valley Community College; Dennis Brown at Capital High School in Helena; Norma Glock at Columbus High School Library; John Meckler at the Plains High School; Arlie Patton at Billings West High School; Chris Ruffatto at Whitefish High School; Jon Kaps, Flathead High School Library; and Gil and Marilyn Alexander at Canyon Ferry Limnological Institute.

Training procedures have been established. Training will be offered on-site as the site comes on-line. If several libraries come up at same time, then training may be offered at the Montana State Library (MSL). Non-librarians may be offered training at MSL if there is a contract to at least semi-sponsor it.

All librarians who have ArcView were interviewed in the spring. We discussed several ideas to keep in contact. These included a bulletin board on metnet, Big Sky Telegraph in Dillon, and the national internet connection via the Association of Research Libraries list service, and/or articles in the Montana State Library newsletter. We presented an update on the "GIS in Libraries" project during a two hour seminar at the Montana Library Association conference in April in Butte.

The unix workstation in the reference section of the State Library was replaced with a PC in fall 1994 to help make user access easier.

PROJECTS OVERVIEW

Department of Health and Environmental Services - Clark Fork Superfund Project: The Clark Fork GIS (CFGIS) continues to be the largest project for NRIS GIS. The system, in place since 1988, is at full maturity. Traditionally map products have been the primary product produced by the CFGIS. This trend continued during FY94 with 2,551 maps delivered. As the system develops and more analytical data are made available by the Clark Fork Data Management System (CFDMS), the GIS has been used for more analytical uses. Some example analytical tasks completed this year include:

Calculate volume of intersection between groundwater and tailings for various groundwater levels. Groundwater and tailings data were imported from a project contractor. Using the GIS, three-dimensional databases were then created of the tailings extent and groundwater levels. The two databases were intersected and volumes calculated. The process was repeated for five different water levels. This type of analysis requires the development of very large databases and takes many hours to process.

Create isoline map of arsenic levels. Arsenic sample locations were acquired from CFDMS and imported into the GIS. They were then used to develop a three-dimensional surface of arsenic concentrations. Once the three-dimension surface was created the GIS was used to generate isolines of arsenic concentrations. The data were then combined with other data from the CFGIS to create an isoline map in the Anaconda Old Works area.

Create map depicting groundwater quality using Stiff diagrams. Analytical data were imported into the GIS system from the CFDMS that depicted groundwater quality parameters for the Milltown area. A program developed by GIS staff was run against the data to produce a database of Stiff diagrams. The Stiff diagrams are graphs that depict six groundwater parameters at each well location in the database. The Stiff diagrams were then combined witih other data from the CFGIS to create a map of the project area.

Bonneville Power Authority: Under contract with the Bonneville Power Authority (BPA) NRIS GIS provided technical support to State agencies involved with the Montana GAP Analysis Project (GAP) and the Generating resource Database (GENRES) development project. We assisted the Montana Department of Natural Resources and Conservation (DNRC) Energy Division in the purchase and installation of their GIS hardware and software. This assistance involved both on-site support and phone support on issues including hardware configuration, operating system setup, network setup, operating system support, and GIS software support. We also provided GIS training to DNRC staff. Classes were conducted over a four week period and topics included: 1. Data Model;, 2. Spatial Data Automation;, 3. Attribute Data Automation;, 4. Data Display & Database Construction;, 5. Attribute Data Manipulation;, 6. Spatial Data Manipulation. For Montana Fish, Wildlife, and Parks (FWP) we provided map plotting services and technical support.

State Historic Preservation Office: GIS staff worked with the State Historic Preservation Office (SHPO) to develop a database for a major project they have on the Flying D ranch in south western Montana. The project phases completed this year were mainly related to database development. Some databases were acquired from federal sources, some was entered from USGS 7.5 minute quad maps, and some was entered from SHPO source documents. GIS staff also collected field data using Global Positioning System (GPS) technology. This was the first time NRIS GIS staff have used GPS technology on a project. We spent two days working with SHPO staff on-site collecting archeological datum locations, archeological sites, physical features, and cultural features. Post-processing of the GPS data collected in the field refined the accuracy to between 2 and 5 meters for each point collected. The data development phase should be complete in mid FY95 at which time SHPO and GIS staff will start looking at various types of analysis and products development the GIS can be used for.

U.S. Forest Service: The GIS program has been working on several projects with the US Forest Service (USFS) during FY94. For the Helena National Forest we used land type characterization databases we assisted in developing over the last four years. The data helped with the development of an Environmental Impact Statement (EIS) for oil and gas development on the forest. The EIS required the combining of 50 GIS databases in seven different combinations to develop criteria for evaluating seven development alternatives.

For Region 1 of the Forest Service, the GIS has developed databases in support of the Columbia River Basin Assessment (CRB). This project entails acquiring data from the US Geological Survey (USGS), the individual forests in the Basin, and data supplied by a local engineering firm that contracted with the USFS to develop map databases using scanning technology. Due to the size of the project area there are significant data processing and automation steps required to assimilate the databases accurately and efficiently. This project will move out of the data acquisition phase in mid FY95 and begin analysis steps for supporting the development of an EIS for the entire Columbia Basin.

Montana Department of Fish Wildlife and Parks: NRIS provided several services to FWP in FY94. Included were:

River Reach Database Development: - Under contract with the Fisheries Division NRIS has initiated development of a statewide Geographic Information System (GIS) river reach database. This database provides the vehicle for managing and analyzing environmental, natural resource, and management information associated with surface water features.

Major tasks undertaken as part of this project are: indexing the river reach database to the Montana Rivers Information System (MRIS) database; organizing a River Reach Technical Working Group to set directions for database development and pursue joint funding opportunities; and developing procedures for completing enhancements of the river reach database.

Technical Support: NRIS provided the Kalispell office assistance in using GIS software and hardware during the period as well as various GIS data layers. NRIS also provided access to its' electrostatic plotter for producing large color printouts of maps developed by FWP staff on their GIS system.

Department of State Lands: NRIS worked with two DSL bureaus during FY94. Projects included:

Coal and Uranium Bureau: During FY 1994, the GIS provided various services in support of the Department of State Lands (DSL) Coal and Uranium Bureau GIS. GIS continued to supply technical support to DSL GIS staff, we helped load new releases of the GIS software, and we also provided several data sets as requested by DSL staff.

Abandoned Mine Bureau: NRIS GIS developed a statewide mining district layer in conjunction with a DSL contractor. This layer was used in conjunction with other data residing at NRIS to develop a statewide mining district map. The mining district layer is also being used to develop individual maps of each of the 230 mining districts in the state. GIS staff have developed numerous programs to automate this process so it may be completed consistently and efficiently..

Natural Resource Damage Claim: The NRIS GIS provided various GIS services under contract to the Natural Resource Damage Claim (NRDC) in the Montana Department of Justice during FY 1994. Tasks completed included map design, database development, and analysis. NRIS also supplied NRDC contractors with various databases for their use.

1994 Natural Heritage Program Report

ADMINISTRATION

Several new projects initiated this year are noteworthy: the Columbia River Basin Assessment is a multi-year, multi-state biological assessment undertaken by the US Forest Service (USFS) by directions from Congress. The USFS has partnered with The Nature Conservancy and Montana Natural Heritage Program to work on the ecological assessment (primarily vegetation) for the CRB. Funding for this project is through the TNC Regional Office and has provided support for an assistant ecologist, additional support for Dr. Stephen Cooper, and some support for data management and administrative assistance. Much of the required data acquisition and analysis work will be done by contractors in Missoula. Another project to identify abandoned mines with significant biological resources was initiated with the Department of State Lands (DSL), Abandoned Mines Reclamation Bureau. This will entail work on three mining districts to determine the status of bat use and other rare species in or near these adits. Zoology staff worked with DSL Coal Burerau staff to review impacts and proposed mitigation and monitoring for several coal mines in eastern Montana. Botany staff worked with Montana Department of Fish, Wildlife, and Parks (FWP) Parks Managers to identify rare plants and advise on weed control measures.

Federal challenge cost-share projects continue to provide a significant opportunity to conduct de novo field surveys and produce conservation strategies for some of Montana's rarest species and communities.

Data requests increased again, continuing the trend for a more service-oriented program. We are responding by putting more emphasis and developments into the access and delivery of information. Linkages with GIS and development of new databases and systems, described below, have positioned us to stay abreast with the rising demands for information on biodiversity and land management.

DATA MANAGEMENT: *Acquisition, storage, manipulation, and retrieval of information for project planning and research*

The Heritage Program conducted significant research and inventory projects during the year, and provided information services to state and federal agencies as well as county/local, private, academic and foreign requestors.

Over 800 data requests were handled in FY 1994: an average of 65 requests per month and an increase of over 25% from FY93. This figure does not include an average of 60 requests per month logged by U.S. Forest Service staff in Region 1 via a subset of Heritage data available on their mainframe system.

Service to requestors remained a high priority for data management staff. Response time continued to be under five days for all but the most complex requests. Information on sensitive species in the vicinity of planned projects or development

was the most frequently-received type of request. This included, for example, review of all opencut mining applications from the Department of State Lands, proposed highway projects from the Montana Department of Transportation, proposed timber sales or other management activities from DSL's Forestry Division, and species and site-specific information for the Department of Fish, Wildlife and Parks.

Information was solicited and processed for a 1995 revision to Montana Bird Distribution. Distribution data on Montana's amphibians and reptiles were also mapped, digitized and computerized, in preparation for a guide to be distributed in Montana Outdoors in spring 1995. And a literature review on mollusks was conducted, providing preliminary information on the presence and distribution of bivalves in the state.

Database growth was substantial, with approximately 400 species occurrence records mapped and computerized, and almost 3,000 literature sources abstracted and entered. The number of records now in the Heritage database system totals over 20,000, with approximately 30% of those records updated during the course of the year.

ZOOLOGY: *Research, Monitoring, Inventory, and Technical Information Service on Animals*

Results from eight 1993 zoology studies have been written up in reports. Highlights of nine zoology field projects in 1994 include the following:

Harlequin ducks, a federal candidate for endangered species status, were surveyed and monitored in the Flathead and Clark Fork drainages with mixed results; reproduction ranged from poor to excellent in drainages examined. Amphibians and reptiles were surveyed on the Lewis and Clark, Kootenai, and Custer National Forests; results indicate Leopard Frogs have undergone a dramatic decline in western Montana in the past 30 years. Mollusks, perhaps the most endangered group of animals in North America, were surveyed in Northwest Montana; the Rocky Mountain Capshell, known from only 2 sites in the U.S.A., was relocated in Glacier National Park. Bats were surveyed using new electronic recording devices on the Custer, Lewis and Clark, and Kootenai National Forests.

Bird banding included white pelicans at Arod Lake and Canyon Ferry Wildlife Management Area colonies (500 birds) and harlequin ducks in the Flathead and Clark Fork drainages (33 new birds). Nine birds (all females) marked as juveniles in 1992 returned to their natal streams in 1994; 4 birds marked in Glacier National Park were relocated by the Canadian Wildlife Service on their wintering range on the Pacific Coast of British Columbia.

Work continued on a Montana/Idaho Harlequin Duck Conservation Plan in conjunction with a number of state and federal agencies. This is scheduled for completion in spring of 1995.

Distribution and reproductive information was gathered on Northern Bog Lemmings for museums throughout North America to help in preparation of a status report and management plan.

Amphibians and reptiles of Montana will be featured in a 16 page Montana Outdoors article (spring 1995) being prepared by NHP and Fish, Wildlife and Parks personnel.

We continued our work with the Partners in Flight Steering Committee and the Montana Piping Plover Working Group.

The Montana Animals Species of Special Concern list was updated in 1994.

BOTANY: *Research, Monitoring, Inventory, and Technical Information Service on Rare Plants*

Results from twenty 1993 botany studies have been written up in reports. Highlights of 15 botany field project studies in 1994 include the following:

Systematic botanical inventory was conducted on priority state lands having known or suspected biodiversity significance, and produced noteworthy results:

- Bannack State Park bluffs and surrounding BLM lands proposed for state management have one of the largest known populations of a globally rare twinpod mustard known only from Montana, and intact upland diversity

- Bluewater Fish Hatchery has a total of three state rare plant species and biologically diverse plant communities

- Chief Plenty Coups State Park has a stand of hackberry trees growing in the wild, the first report of this species in Montana

Rangewide genetic research was initiated on a candidate threatened plant, Spalding's campion, toward the goal of producing a conservation strategy. Only the four largest populations in each of the four states where it occurs produced sufficient numbers of flowering stems for the genetics work, but the numbers were too low for conducting pollination research. Dancing Prairie in Montana is the largest population in the world by orders of magnitude. The next two largest populations in Montana were also revisited at Wild Horse Island and Black Bear Ranch, and write-ups of the visits prepared.

Sensitive species surveys were conducted for the Sioux District of the Custer National Forest in Carter Co., Montana and Harding Co., South Dakota to produce a sensitive species baseline. Four new additions to the Montana flora were discovered (three rare native species, one exotic species), a total of eight rare species were documented in Montana and five rare species in South Dakota.

Annual monitoring work culminated for a candidate threatened plant, Lemhi beardtongue, conducted for six consecutive years on Beaverhead National Forest and for four consecutive years on BLM lands in the same county. A final report summary is being prepared.

The first poster on Montana rare wildflowers was organized by Heritage Program staff through Montana Native Plant Society, Montana Department of Fish, Wildlife and Parks, Montana Department of State Lands, U.S. Forest Service, BLM, BIA, Soil Conservation Service, U.S. Fish and Wildlife Service, Montana Parks and Wildlife Interpretive Association, and The Nature Conservancy. Printing will be completed in fall.

Technical botanical data requests grew in numbers and complexity. Two examples follow:

- We were called by Dr. Jack Rumely, MSU, who received a tulip gentian from the McCone County Extension agent, who got it from a rancher wanting to know whether to spray "this weed" in his pasture. It was determined through BCD that this species is tracked as "S1" in Wyoming and South Dakota, with no record of acting as an adventive or horticultural escape, representing the first time it has been found in Montana, and a northern range extension for the species. Information routed back through extension service convinced the rancher not to spray the tulip gentian. This species has been added to the state plant species of special concern list.

- Nature Conservancy Field Office was approached by a landowner who is interested in protecting a riparian tract of property with the only known Montana occurrence of the rare Small-flower standing-cypress. We were asked for additional information on its undetermined global status. A phone call to a Washington herbarium in the center of its range provided (WHAT INFORMATION? is it found in small, disjunct populations? Few collections? Limited distribution and in unusual habitats?) preliminary indication that it may be globally vulnerable rangewide. GRANK determination is being pursued in cooperation with the four other states/provinces in its range.

Work was initiated on a new database called the Plant Characterization Abstract (PCA), toward the goal of addressing potential impacts, and planning field surveys. An immediate application of the PCAs will be when the Department of Fish, Wildlife and Parks calls to ask if there are any species which may be affected by herbicide treatment at a particular recreation site or FWP-administered lands. We will then have immediate access to information on other rare species nearby in the same general setting and elevation range, and provide information on the phenological "window" for surveying them.

The state list of plant species of special concern was updated in May 1994 and included county of distribution information for the first time. The databases are continually updated as new information becomes available - we recently had an

update in changing Water Howellia federal status to "Threatened", the first plant species in Montana to be designated under the Endangered Species Act.

COMMUNITY ECOLOGY: *Research, Inventory, Monitoring of Plant Communities*

Projects connected with assessing the diversity of plant communities in eastern Montana (Big Dry area) are nearing completion and expected to contribute significantly to our knowledge of this region's ecosystems. A database inventory was provided to the BLM regarding community types and their distribution by management unit; this project has contributed ancillary information concerning the distribution and rarity of certain plant communities that was hitherto lacking.

Continued funding from the BLM and U.S. Forest Service has permitted us to intensively sample communities of southwestern Montana (Centennial and Tendoy Mountain Ranges and valleys), especially rangelands and wetlands, and gain an appreciation of their significance in the ecology of these landscapes. Several new communities have been described and others previously defined can now be more thoroughly described and documented as a result of this research. A significant number of TES plant species were also documented and mapped as a result of this ecological sampling. Portions of southwestern Montana (Centennial Valley and vicinity most especially) have been proposed as the focus of multiagency (U.S. Fish and Wildlife Service, BLM, U.S. Forest Service, Dept. of State Lands) ecosystem management and the classification expected from our sampling is envisioned as the vehicle by which land potential is assessed and mapped.

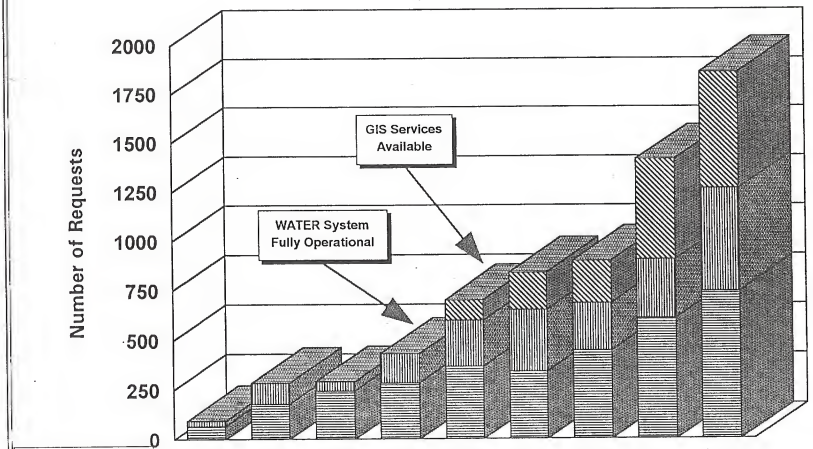
Our program also cooperated in assessing the landscape of the south Elkhorn Mountains, particularly in regard to plant community distribution and will be called upon to produce a map thereof. This map will serve as one input (GIS layer) to an ecosystem perspective analysis of this area by cooperating agencies.

A very large scale assessment project concerning the Columbia River Basin and surrounding lands has involved the program ecologist and has also been the stimulus for hiring an assistant ecologist to coordinate acquisition of massive amounts of plant community data. The NHP is envisioned as the database repository for community data from all federal and state agencies operating in Montana. The CRB project has drawn heavily on the expertise of Heritage program ecologists (or their equivalents in other states) in advising and assisting federal agencies on modeling and mapping vegetation patterns, of both existing and potential natural vegetation for their respective states and provinces (MT, ID, OR, WA, WY, NV & BC). This is the first ecologically oriented project to demonstrate a how a standardized classification and approach can facilitate communication and problem solving across state and jurisdictional boundaries.

Based on our long-term acquisition of community data regarding plant communities and their distribution, the Montana program has been able to make significant input to a massive compendium (published by U.S. Fish and Wildlife Service) documenting

the rarest and most imperiled communities across the whole of the U.S. This document should prove most useful to national and state level planning regarding ecosystem management and long-term planning.

Natural Resource Information System
Data Requests by Fiscal Year

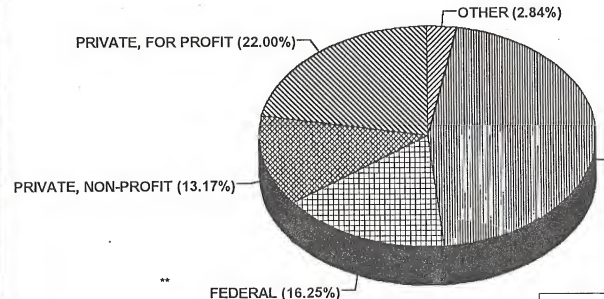


HERITAGE Start-up
October, 1985
NRIS Start-up
January, 1986

Natural Resource Information System

Users by Sector

Natural Heritage Program, Water Information System, Geographic Information System



Total Requests: 1859

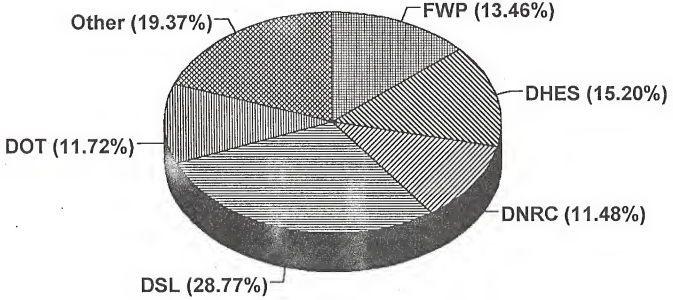
Period of Record: FY 1994

** Federal Sector reflects increased use due to direct, on-line acess to the NHP Data Base

Natural Resource Information System
Users by State Agency

Natural Heritage Program, Water Information System, Geographic Information System

Total Requests: 862

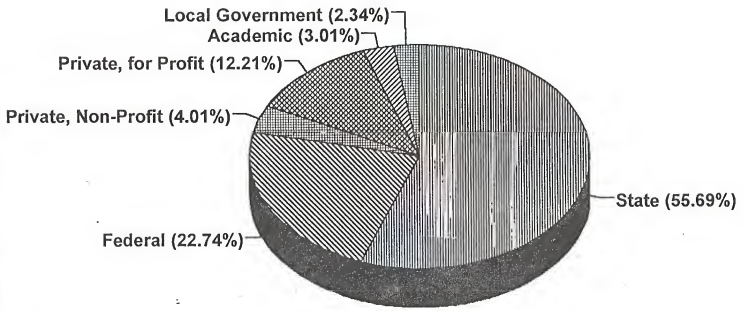


Period of Record: FY 1994

Geographic Information System
Users by Sector

Natural Resource Information System

Total Requests: 598

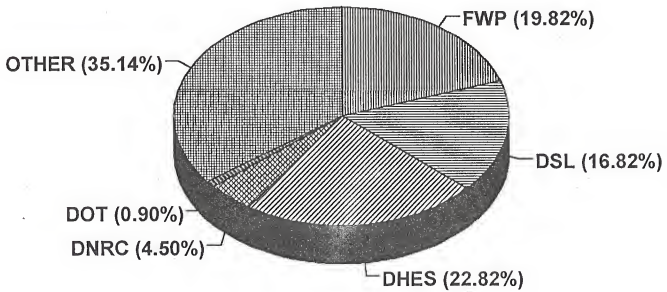


Period of Record: FY 1994

Geographic Information System
By State Agency

Natural Resource Information System

Total Requests: 333

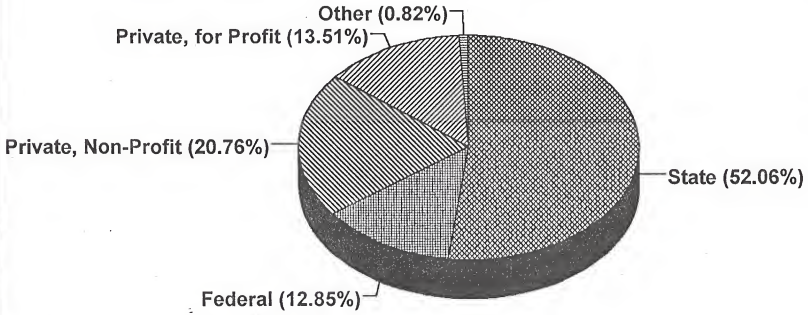


Period of Record: FY 1994

Natural Heritage Program
Users by Sector

Natural Resource Information System

Total Requests: 741

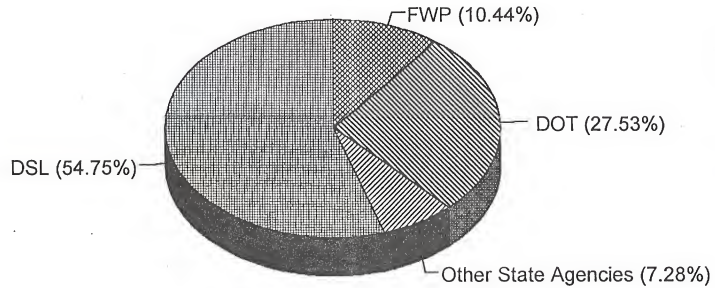


Period of Record: FY 1994

Natural Heritage Program
By State Agency

Natural Resource Information System

Total Requests: 316

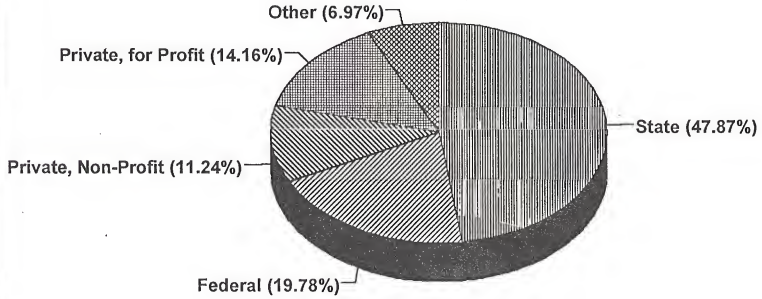


Period of Record: FY 1994

Water Information System
Users by Sector

Natural Resource Information System

Total Requests: 520

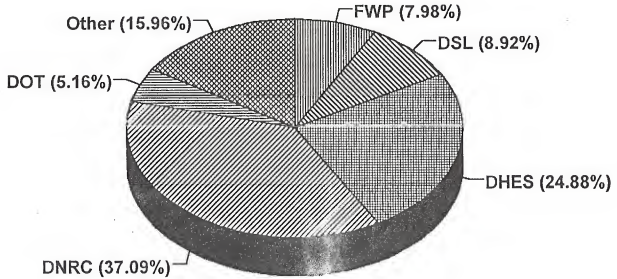


Period of Record: FY 1994

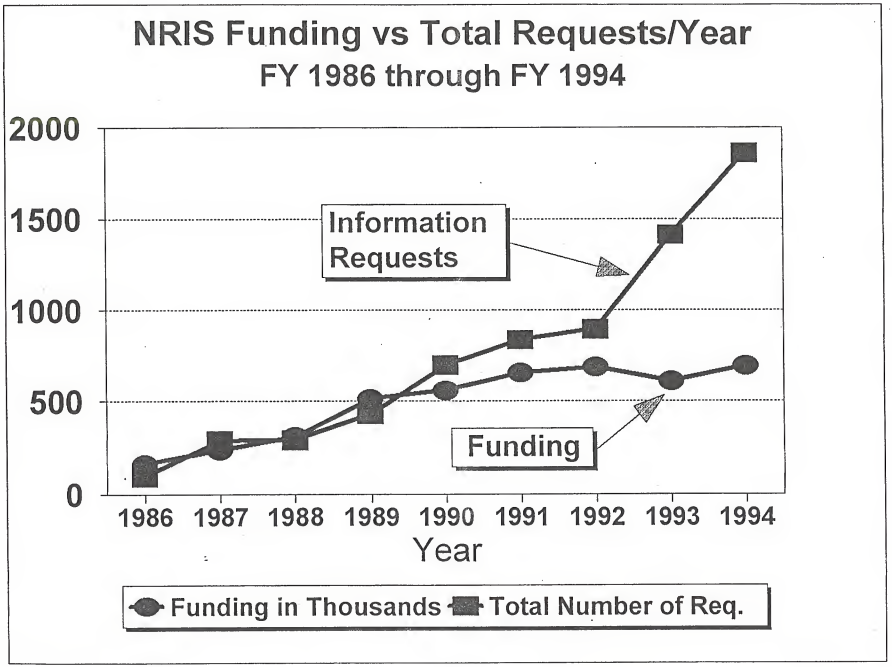
Water System Users
By State Agency

Natural Resource Information System

Total Requests: 213



Period of Record: FY 1994


NRIS Funding vs Total Requests/Year
FY 1986 through FY 1994
2000
1500
1000
500
0
Information Requests
Funding
1986 1987 1988 1989 1990 1991 1992 1993 1994
Year
Funding in Thousands
Total Number of Req.